



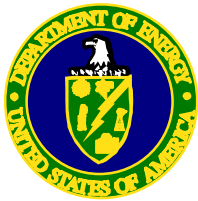
Second Meeting-Annex V Electric Vehicle & Hybrid Electric Vehicle Development

Department of Energy - USA

Ministry of Science & Technology

PRC

August 4-7, 1998, Beijing



Outline

August 4 & 6, 1998

August 4

- Introduction of Team
- Expectations from Meeting & Visit
- Technology Transfer
 - » U. S. Technological Developments
 - » Status of Items from December 1997
- Overview & Feedback on Progress
- Implementation of Advanced Vehicles



Outline

August 4 & 6, 1998

August 6

- Environmental Issues
- Small Business Opportunities
- Technical Training
- Working Together Effectively
- Discussion & Creation of Action Plan



DOE/OTT Annex V Team

- Kenneth L. Heitner, Advanced Automotive Technology
 - Albert W. Carlson, Abacus Technology
 - Carol J. Hammel & Jeffrey M. Fang, National Renewable Energy Laboratory
 - Ben Yamagata, International Institute for Electric Transportation
-
- Peter Paul Jodoin, Asian Affairs
 - Lee H. Gebert, International Outreach



Motivating Energy & Environmental Issues

- Continued Concern About
 - » Urban Air Pollution (with health effects)
 - » Limited Domestic Petroleum Supply
 - » Global Warming
- Long Term Programs to Deal With These Problems Require Concerted Effort and Cooperation



U. S. Expectations from Meeting & Site Visits

- Improved Understanding of China's Programs
- Progress from December 1997 Meeting:
 - » Cooperative Research
 - » Joint Ventures
 - » Market Opportunities



Understanding of China's Programs

- It is difficult to cooperate, if we have not defined common problems
- We hope to gain a greater understanding of what the your program is doing
- We appreciate the difficulties of having limited resources and the need to focus on well defined areas of interest



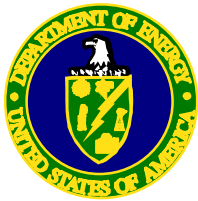
Understanding of China's Programs

- More information about proposed vehicles would be appreciated
 - » Light or Heavy Duty
 - » Capacity - Passengers or Cargo Capacity
 - » Desired Range
 - » Desired Speed and Acceleration
 - » Energy Intensive Subsystems - Heating or Cooling



Cooperative Research

- Identify & encourage cooperative research activities
- Discuss specific proposals
- Find more opportunities



Market Creation

- How China elects to develop its transportation sector has important impacts on the market creation process
- Large overseas corporations already have a substantial role in creating China's technology base
- There may be a need to create unique opportunities for small businesses



Market Creation

- DOE and MoST need to work together to identify technology needs and small businesses that can respond to those needs.
- An objective solicitation process is one good approach to achieving this goal



Technology Transfer - Agreement from Dec 1997

- International Standards & Practices
- Fast Charging
- AC Motor Controllers
- Organization of Federal Government Programs
- Advanced Materials Programs
- Fuel Cells, and
- Utility Interest



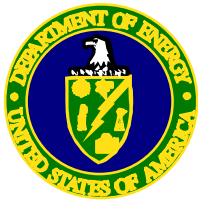
International Standards & Practices

- Provided complete set of current standards and practices
- In China's interest to utilize these where possible
- Potential opportunities for Chinese observers to witness implementation of standards in the US



Fast Charging

- Provided report on fast charging
- Most work in this area is proprietary
- Can help coordinate with US companies involved
- Need further feedback on this area



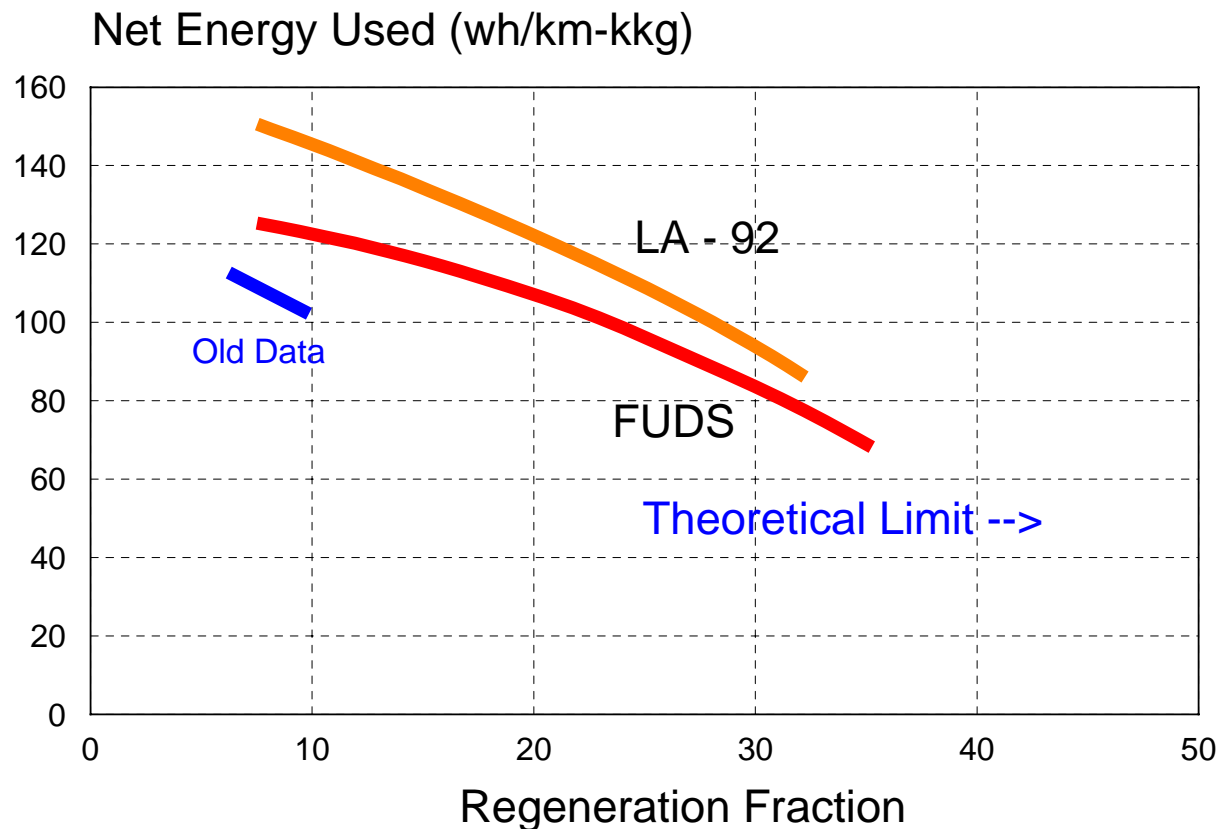
AC Motor Controllers

- Provided reports on AC Motor Controllers
- Anticipate visit to Motor Control Lab
- Providing summary data as standard of performance for Chinese technology
- Technical details on measurement methods can be action item



AC Drive Train - Electrical Performance Data

EV ENERGY CONSUMPTION VS. REGENERATION FRACTION





Organization of Federal Government Programs

- Provided several examples of public plans. Reflect:
 - » Technical & Economic Goals for Technology
 - » Institutional Arrangements & Management Plan to Achieve Goals
 - » Supporting Information as Appropriate



Organization of Federal Government Programs

- Institutional Arrangements for US Research & Development Programs Vary
- New Product Development is Done by Industry
- New Technology Can Come From National Labs, Universities, & Small Businesses



Organization of Federal Government Programs

- New Technology Takes Many Forms
- Examples are:
 - » Concepts and Ideas
 - » Materials and Fabrication methods
 - » Measurement & Diagnostic Techniques
- Integrating These into Existing or New Industrial Processes is a Significant Challenge



Organization of Federal Government Programs

- Transfer of Technology Remains an Issue
- Accelerated Technology Transfer
- Need feedback in this area
- Institutional issues will also be discussed under Implementation



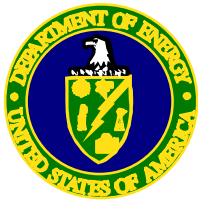
Advanced Materials & Fuel Cells

- Providing Program Overview Materials (Many Open Literature Publications)
- Opportunities:
 - » Standards for Exchange of Automotive Materials Information
 - » Fuel Cell Research
- Need Feedback on Specific Areas of Interest



Utility Interest

- A Few US Utilities Continue to Show Strong Interest in Electric Vehicle Technology
- They are Leaders in EV Implementation and Infrastructure Creation



Utility Interest

- U. S. Utilities Have Formed Small Business Subsidiaries to Support Electric Vehicle Commercialization
- They May Have Potential Business Interests in Creating Infrastructure in China



Current Public Information on R & D

- Light Duty Vehicle R & D Plan
- Fiscal Year 1996 Annual Report
- Fourth PNGV Peer Review Report
- Electric Vehicle Total Energy Cycle Analysis
- AC Motor Controller Studies and Tests



Brief Overview on Progress in U. S. Programs

- U. S. Manufacturers have Launched Electric Vehicle Products in Limited Markets
- Some U. S. Manufacturers Products Have Problems - Usually Related to Batteries
- Second Generation Technology Emphasizes Nickel Metal Hydride Batteries



Brief Overview on Progress in U. S. Programs

- Japanese Companies have Strong Product Technology
- For U. S. Market - Use of Nickel Metal Hydride Batteries is Desired (Cost/Life)
- Electric Buses are also Popular
- Many Municipalities Trying Electric Bus
- Some Hybrid Buses Also Now Available



Brief Overview on Progress in U. S. Programs

- Extensive R & D on Hybrid Technology Continues Under PNGV (See Report)
- Federal Fleet is using EV Loaner Program to Build Interest
- U. S. Postal Service Evaluating EVs In-Depth for Delivery Vehicles



Technical Training

- Technical Training is an Important Feature of All U. S. Advanced Vehicle Technology Programs
- DOE Emphasizes Student Competitions and University Based Research
- China has Received Training from U. S. Auto Companies
- China Should Identify Additional Training Needs



Working Together Effectively

- Barriers to working together
 - » Language
 - » Time Difference
- We have worked more effectively over the last several months
- Exchange of letters by overnight fax is highly effective
- Need to continue to use these tools



Creation of an Action Plan

- Identify Tasks for Each Side
- Commit to a “Reasonable” Schedule
- Deliver Materials to the Other Party
- Develop Potential Personnel Exchanges
- Improved Communication Methods